REMARKS

This is in response to the Office Action dated June 22, 2007. In view of the foregoing amendments and following representations, reconsideration is respectfully requested.

By the above amendment, claims 4, 9 and 10 are amended. Thus, claims 1-10 are currently pending in the present application.

The first page of the specification and abstract have been amended to update the status of the parent application. The specification has also been amended to address a number of minor informalities. Note that the changes to the abstract are presented in the form of a substitute abstract. Copies of the amended portions of the specification, claims and abstract are included.

Next, on pages 2-3 of the Office Action, claims 1 and 4-7 are rejected under 35 U.S.C. 102(b) as being anticipated by Gudmundsson. Also, claims 2-3 and 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gudmundsson.

It is submitted that the present invention, as defined in the pending claims, clearly distinguishes over the Gudmundsson reference for the following reasons.

The present invention is directed to a system for the treatment and transportation of a flow of fluid hydrocarbons containing water. To anticipate the system defined in claim 1, each of the elements listed in claim 1 must be disclosed and connected with each other in such a way that hydrocarbons may pass through the entire system. A distinguishing feature of the present invention with regard to the Gudmundsson system is that the second heat exchanger in the present invention is positioned subsequent to the reactor and the recycle line leading from the separator to the reactor.

The object of the present system is to recycle dry hydrates from the separator to the reactor in order to control the formation of hydrates. The present invention is a system designed to remove water and allow the system to deal with particles/gas hydrates. To the contrary the Gudmundsson reference discloses a water-rich system that is always in excess of water after the hydrate formation in the reactor. The claims recite several features that distinguish over Gudmundsson as will be discussed below.

In the explanation of the rejection, the Examiner takes the position that the Gundmundsson system includes an apparatus for the treatment and transportation of a hydrocarbon containing water, which includes a hydrocarbon source (1), a first heat exchanger (5), a reactor (6), a second heat exchanger (11), and a separator (element 1c). The Examiner specifically refers to col. 6, lines 1-67 and col. 9, lines 1-9 of the Gundmundsson reference in which it is described that the reactor 6 is supplied with pressurized water 7 through nozzles 9 to produce hydrates. Note, in lines 23-25 of col. 6, it is emphasized that "the water pressure should be adjusted to achieve sufficient volumetric injection of water to the reactor and properly dispersing the water in the gas phase as fine droplets." Further, the hydrate formation rate can also be increased by adding small seeds of hydrate crystals to the reactor via line 7A.

In contrast, in the present invention, the hydrocarbons from the reactor are cooled in a heat exchanger to ensure that all free water present is in the form of gas hydrates before this flow is recycled to the reactor (see page 4, lines 4-8 of the present specification).

Claim 1 requires, *inter alia*, that the following elements which are connected to each other and are listed in a direction of flow:

a connection to a hydrocarbon source;

a first heat exchanger;

a reactor;

a second heat exchanger;

a separator; and

a pipeline.

As noted above, the Examiner takes the position that the element 1C of Gudmundsson corresponds to the separator and that the refrigeration unit 11 corresponds to the second heat exchanger. However, element 1C is located upstream of the unit 11, and thus these elements are not located in a direction of flow as expressly required in claim 1. In other words, the reverse arrangement is disclosed in the prior art reference. Accordingly, Gudmundsson does not meet each and every limitation of claim 1, and therefore cannot anticipate claim 1 under 35 U.S.C. 102(b).

Further, amended claim 4 recites "means for adding chemicals to the flow upstream of the reactor." This feature is described on page 4, lines 16-17 which explains that it "is sometimes desirable to add certain chemicals to the flow upstream to the reactor". In addressing claim 4, the Examiner relies on col. 6, lines 38-39 of Gudmundsson, which discloses adding small seeds of hydrate crystals to the water 7 to be supplied to the reactor (see Fig. 3). This permits the hydrates to be easily grown in the reactor. Thus, the hydrate crystals are added directly to the reactor.

Claim 5 requires "means, located between the separator and the pipeline, for mixing the flow from the separator with wet gas before the flow enters the pipeline." The Examiner takes the position that:

"With respect to claim 5, that the means are located between the separator for mixing the flow with a wet gas, this has been taught by adding pressurized water (7) into the reactor as well as adding water, note water line 15, after the reactor as shown in Figure 3 of Gudmundsson."

However, Gudmundsson teaches the addition of pressurized water (7) into the reactor as well as adding water via water line 15 to an apparatus 13 (see Fig. 3). As described in col. 8, lines 28-35, the water line 15 is supplied to apparatus 13, in which the agglomerated hydrate particles are covered with a pure ice shell by spraying the agglomerated particles with water that freezes and forms an ice shell on the particles. This is accomplished by spraying the agglomerated particles with water (supplied via line 15) through nozzles 16. The particles are then transported downstream by means of a mass transporter (see Fig. 3). Clearly, the water line 15 does not meet the language of claim 5 which requires means for mixing the flow from the separator with wet gas before the flow enters the pipeline. Thus, claim 5 is not anticipated by the Gudmundsson reference.

Further, claim 6 requires "another separator, located between the second heat exchanger and the separator, for recovering hydrocarbon gas from the flow."

In addressing claim 6, the Examiner refers to Fig. 3 of Gudmundsson for a second separator and heat exchanger but there is no specific indication of the position of the equipment. Based on the system shown in Fig. 3, there appears to be only one separator (2) positioned before the reactor and one separator (indicated 1C) subsequent to the reactor. Thus, the specific arrangement recited in claim 6 is neither disclosed nor suggested by the Gudmundsson reference.

Further, claim 7 requires "means for adding cooled condensate under pressure to the line from the separator to the reactor." The Examiner takes the position that claim 7 is

disclosed in Fig. 3 of Gudmundsson because hydrate seeds and pressurized water are supplied to the reactor via lines 7A and 7 (see Fig. 3). However, the addition of pressurized water and hydrate seeds supplied via lines 7 and 7A is clearly different from the present invention as defined in claim 7 (see page 9, lines 16-19 of the present specification). In the present invention cooled hydrocarbon condensate under pressure may be added (via 16) to the recycled flow in order to dilute the hydrate particle concentration. It should be noted that claim 7 is dependent on claim 1 which defines a system which includes the line for recycling dry hydrates to the reactor and not water with hydrate seed as supplied to the reactor through nozzles 9 as in Gudmundsson.

Further, with reference to the obviousness rejection, claim 2 requires a water-repellant material coating the inside of the reactor. The Examiner takes the position that this feature would have been obvious to a person skilled in the art based on Gudmundsson. Applicant disagrees with the Examiner's position because there is no indication that the interior surface of the reactor in Gudmundsson presents any problem that would require a special coating. Thus, there is no reason to believe that a water repellant coating would have any application in the Gudmundsson reactor.

Further, each of claims 3 and 8 requires a mixer located between the first heat exchanger and the reactor. The Examiner takes the position that a similar mixing function is obtained in Gudmundsson in which compressed and cooled gas is supplied to the reactor 6 via nozzles 10. However, the Gudmundsson system clearly does not meet the express language of claim 8, which requires an additional element. The Examiner opines that the function is performed in Gudmundsson, and thus the requirement for a mixer in a particular location in the system is met.

However, claim 8 requires a separate element (i.e., the mixer located before the reactor), and the Gudmundsson clearly does not disclose or suggest a corresponding feature. Therefore, claim 8 is not properly rejected in view of the Gudmundsson reference.

Further, each of claims 9 and 10 requires "means for adding chemicals to the flow." This feature is not met by Gudmundsson as discussed above in connection with claim 4.

In view of the above, it is submitted that claims 1-10 are clearly allowable over the Gudmundsson reference, which does not disclose a system including a heat exchanger which removes water in order to obtain dry hydrates/hydrate seeds that are recycled to the reactor.

In view of the above, it is submitted that the present application is now clearly in condition for allowance. The Examiner therefore is requested to pass this case to issue.

In the event that the Examiner has any comments or suggestions of a nature necessary to place this case in condition for allowance, then the Examiner is requested to contact Applicant's undersigned attorney by telephone to promptly resolve any remaining matters.

Respectfully submitted,

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ABSTRACT

~~A method of~~ A treatement and transportion system for transporting a flow of fluid hydrocarbons containing water, ~~through a treatment and transportation system~~ The system including a pipeline, wherein the flow of fluid hydrocarbons is introduced into a reactor where it is mixed with particles of gas hydrates which are also introduced into the reactor. The effluent flow of hydrocarbons from the reactor is cooled in a heat exchanger to ensure that all water present therein is in the form of gas hydrates. The flow is then treated in a separator to be separated into a first flow and a second flow. The first flow has a content of gas hydrate and is recycled to the reactor to provide the particles of gas hydrates mentioned above. The second flow is conveyed to a pipeline to be transported to its destination.

Version with Markings to Show Changes Made